books was his "Religion and Chemistry," published in 1864, which maintained that the designs of a higher intelligence were to be discovered in the province of chemistry. Among other books were: "The New Chemistry," and its companion volume, "Laboratory Practice," reviewed in NATURE, vol. xlvi. p. 99, "The Elements of Chemical Physics," "The Principles of Chemical Philosophy," and "Scientific Culture."

Prof. Cooke was a highly cultivated man, whose attention was directed to many things outside of his own profession. One of his last published papers was written to recommend that scientific men should be educated more broadly. He did not believe in an exclusively scientific education.

His funeral on September 6 was attended by a group of men and women, whose mere presence was the highest compliment that could be paid to the memory of any man. The successors of Longfellow, Lowell, and the brilliant coterie with which Prof. Cooke was so long a part, were glad of the opportunity to show their love and respect for the man who was all but the last of his generation, there being only a very few of his early contemporaries left.

Among the well-known people present were President C. W. Eliot, Profs. H. B. Hill, W. W. Goodwin, Francis J. Child, Josiah Royce, C. L. Jackson, G. A. Bartlett, Edward Cummings, Ira N. Hollis, Dr. Samuel A. Green, Prof. William Watson (one of the secretaries of the American Academy of Arts and Sciences, of which Prof. Cooke was president), Dr. Henry P. Wolcott, and Dr. Benjamin E. Cotting.

NOTES.

MR. FRANK McCLEAN, writing to Dr. Gill, under date of August 10, has expressed his desire to present a large equatorially mounted telescope, equipped for photographic and spectroscopic work, to the Royal Observatory at the Cape of Good Hope. With this object he has arranged with Sir Howard Grubb for the construction of a photographic refracting telescope of 24 inches aperture, and for an object-glass prism to work with it, having a refracting angle of 7½ degrees and the same aperture as the object-glass. The glass for the object-glass and prism have already been secured, and the definitive order for the instrument was given to Sir Howard Grubb on May 4 last. Coupled with the photographic telescope there is to be a visual refracting telescope of 18 inches aperture. The mounting is to be sufficiently elevated to allow a slit spectroscope, for the determination of stellar motions in the line of sight, to be attached to the photographic telescope, and the gift will include such a spectroscope, as well as an observatory of light construction. Subject to the concurrence of the Lords Commissioners of the Admiralty, Dr. Gill has cordially and gratefully accepted this noble gift to the Cape Observatory.

CAPT. W. J. WHARTON, the hydrographer of the Admiralty, has sent us a copy of a report, drawn up by Mr. P. W. Bassett-Smith, on the results of dredgings obtained on the great bank known as the Macclesfield Bank, in the China Sea. It may safely be asserted that never before has the biological condition of a sunken coral reef in mid-sea been so completely explored. One of the general results of the whole examination, hydrographical and zoological, is that on the whole of the two hundred miles forming the periphery of the bank, there exists a rim of coral in luxurious growth, and at a remarkably even depth below the surface of from ten to fourteen fathoms. Capt. Wharton points out that this evenness of depth is the most striking feature of the chart, and when the great distances are considered, this appears to be a strong argument against any movement of the bottom since the atoll form was assumed. It is at any rate quite evident that from the present time onwards no movement is necessary in order to form in the future a perfect atoll, the simple growth of the coral on the rim sufficing; and that we may have here an instance of a suitable original foundation for an atoll so formed, as pointed out by Mr. Darwin. Mr. Bassett-Smith's examination of the specimens was necessarily very cursory, and it is to be hoped that the mass of material collected may be thoroughly investigated by skilled zoologists at the British Museum, that full value may be obtained for the labour bestowed upon these examinations. The work is so admirable, and the results so important, that we shall return to the subject in a future issue.

AT several London and provincial medical schools, on Monday last, the opening of the winter session was made the occasion for introductory addresses to the students. Dr. Isambard Owen, at St. George's Hospital, discoursed chiefly on the importance of mental training in medical study. He remarked that the method of the physician was the method ordinarily employed in all forms of physical investigation. Science consisted of soundly-drawn conclusions based upon accurately-made observations. Accurate observation was the foundation of all medical work; and Dr. Owen dwelt at some length on the fallacies of ordinary observation, and the scrupulous care needed to ensure exactitude. At St. Thomas's Hospital, the Rev. W. W. Merry delivered an address mainly concerned with Plato's criticisms upon the practice of medicine and surgery in Homeric times. Mr. G. Hartridge offered practical counsel to the students at Westminster Hospital, and, as an inducement to work, remarked that "the Royal Society numbers among its members a large proportion of medical men, a much larger number than all the other professions put together." At Middlesex Hospital, Dr. R. Boxall discoursed upon the relations existing between the public, the medical profession as a whole, and medical charities. Words of exhortation and advice were also offered at St. Mary's Hospital, by Dr. S. Spicer, and at University College Hospital, by Prof. H. R. Spencer. Miss M. Sturge advised the students at the London School of Medicine for Women to cultivate from the first a scientific habit of mind, as its possession was invaluable to the medical profession. Lord Bacon's words, "We must be content to stand before nature and ask questions; nature can only be subdued by submission," were quoted as a clue to the method of work of all great physicians.

THE Council of the Institution of Civil Engineers has issued a long list of subjects upon which original communications are invited. Papers upon any question of professional interest will have their merits considered, even if they do not deal with subjects specified in the list. For approved papers the council has the power to award premiums, arising out of special funds bequeathed for the purpose, the particulars of which are as under:—(1) The Telford Fund, left "in trust, the interest to be expended in annual premiums, under the direction of the council." This bequest (with accumulations of dividends) produces £235 annually. (2) The Manby Donation, of the value of about £10 a year, given "to form a fund for an annual premium or premiums for papers read at the meetings." (3) The Miller Fund, bequeathed by the testator "for the purpose of forming a fund for providing premiums or prizes for the students of the said institution, upon the principle of the 'Telford Fund.'" This fund (with accumulations of dividends) realises nearly £140 per annum. Out of this fund the council has established a scholarship, called "The Miller Scholarship of the Institution of Civil Engineers," and is prepared to award one such scholarship, not exceeding £40 in value, each year, and tenable for three years. (4) The Howard

Bequest, directed by the testator to be applied "for the purpose of presenting periodically a prize or medal to the author of a treatise on any of the uses or properties of iron, or to the inventor of some new and valuable process relating thereto, such author or inventor being a member, graduate, or associate of the said institution." The annual income amounts to nearly £15. The next award will be in 1897. The council will not make any award unless a communication of adequate merit is received, but will give more than one premium if there are several deserving memoirs on the same subject. In the adjudication of the premiums, no distinction will be made between essays received from members of the institution or strangers, whether natives or foreigners, except in the cases of the Miller and the Howard bequests, which are limited by the donors. There is no specified date for the delivery of MSS., as when a paper is not in time for one session it may be dealt with in the succeeding one.

THE Queen has been pleased, on the recommendation of the Secretary for Scotland, to approve of the appointment of Mr. Angus Sutherland, M.P., as chairman of the Scottish Fishery Board.

THE death is announced of Prof. K. M. Albrecht, of Hamburg, at the age of forty-three. He was the author of several important researches in the domains of zoology and comparative anatomy.

DR. CHARLES L. EDWARDS has been appointed to the Chair of Biology in the University of Cincinnati, Ohio, U.S.A.

AT St. Helens, on Tuesday, Colonel Gamble laid the foundation-stone of an institute which is to form a central library and reading-room and a school for technical education and manual instruction. He has given the site, and will spend £20,000 on the building.

MR. WILLIAM LUNT, of the Royal Gardens, Kew, who acted as botanical collector to Mr. Theodore Bent's expedition to the Hadraumaut Valley, Southern Arabia, has been appointed, by the Secretary of State for the Colonies, Assistant Superintendent of the Royal Botanic Gardens, Trinidad.

SEVERAL earthquake shocks, accompanied by subterranean rumblings, were felt at Dortmund, Germany, on Tuesday morning, and caused some alarm.

AT the meeting of the Royal Photographic Society, to be held on Tuesday next, the medals will be presented to successful exhibitors at the annual exhibition, and the President will deliver an address.

THE new buildings of the Durham College of Science, Newcastle-upon-Tyne, will be opened by the Mayor of Newcastle on Tuesday, October 9.

SUNSHINE is such an untrustworthy quantity in the climate of the British Isles, that it is no wonder that professional photographers have for some time been developing methods for making themselves independent of it. Judging from the extent in which artificial illumination is used in photographic studios at the present time, it seems probable that a few years hence the sun will be largely (if not entirely) disregarded in negative-making. An exhibition of apparatus for illuminating studios, and some of the pictures obtained by means of artificial light, is now being held at the *Photogram* Commercial Museum, and will remain open until the end of this month. A number of interesting exhibits are on view. There are various magnesium lamps, electric lamps designed for portraiture work, and gas-light systems for studios. Two of the most interesting instances of the use of magnesium flash-lamps are to be found in the pictures obtained by Mr. J. C. Burrows in the tin mines of Cornwall, and Mr. H. W. Hughes in the coal mines of the Black Country. The exhibition well deserves a visit.

THE *Weather Review*, edited by Mr. John Eliot, and published every month by authority of the Government of India, always contains an admirable summary of the chief features of the weather in India during the month to which it refers. The annual summary, which has just reached us, contains a discussion of the meteorology of India for the year 1893. The report reminds us that meteorological data in India are chiefly utilised for the following purposes: (1) In the discussion of the prevalence and spread of diseases, more especially of cholera and other diseases of an epidemic character; (2) in connection with agricultural questions, more especially the progress and character of the crops as determined by the weather conditions of the period. In the monthly reviews, all the meteorological facts and data are therefore presented from these two points of view. For medical statistics India is divided into eleven provinces, which are believed to be fairly homogeneous so far as the conditions of the prevalence of the more common diseases are concerned. According to the second method of arrangement, there are fifty-two meteorological divisions, or areas divided from an agricultural standpoint. By following this plan, the meteorological data available are made to yield the greatest amount of good to the people of India.

QUESTIONS of natural history assume a particular value when they deal with the supply of a popular article of food, and we present, therefore, some conclusions recently arrived at by Mr. F. H. Herrick, of the U.S. Fish Commission, upon the reproductive habits of the American lobster (*Zoologischer Anzeiger*, xvii. No. 454). It is not improbable, as Mr. Herrick suggests, that the habits of the European lobster are essentially the same as those of its American relative. (1) The majority of adult females extrude their eggs during June, July, and August, but a considerable number—probably 10 per cent. of the entire number which breed in the year—lay eggs in the autumn, winter, and spring. (2) The lobster cannot possibly breed oftener than once in two years. (3) The eggs are carried by the mother for ten or eleven months: on the coast of Massachusetts, from the middle of July to the middle of the following June. (4) Sexual maturity is reached occasionally at a length of 8 inches, but sometimes not under 12 inches. The majority, however, are mature when 10½ inches long. (5) The numbers of eggs produced by female lobsters at each reproductive period increase in a geometrical series, while the lengths of the lobsters producing these eggs vary in an arithmetical series. A lobster 14 inches long will produce four times as many eggs at one laying as a lobster of only 10 inches. (6) Out of the 10,000 eggs produced at one time, not more than two arrive at maturity, and even this estimate is probably too high, as the fisheries are now declining.

THE exact measurement of the density of very dilute aqueous solutions to within a millionth of its value, is the subject of a paper by F. Kohlrausch and W. Hallwachs in *Wiedemann's Annalen*. The method adopted was that of suspending a glass globe in the solution by a fine thread, and determining its weight. The thread found most suitable was a single smooth cocoon fibre. Small disturbing fibres or dust particles could be detected by the behaviour of the swinging balance. The stirring was done by means of a glass rod bent into a horizontal ring at the bottom, and carrying a ring of platinum foil. During stirring, the glass body was lifted by another glass ring provided with pieces of platinum wire to prevent the body sticking to it. The thermometer indicated hundredths of Centigrade degrees, and could be read to thousandths by the telescope. The sensitiveness of the balance employed was not excessive, since it gave a deflection of two-thirds of a millimetre for a milligram. The weight of the suspended body was 133·310 gr., and the loss of weight in the solutions was always over 129 gr., so that the thread was not required to support more than 4 gr. The loss of weight in pure water was 129·194 gr. at 17°·50 C., and did not vary by more than 0·002 gr. in five months. The difference in the individual numbers for the loss of weight in any given liquid was 0·11 mg. on the average, which corresponds to about a millionth of the density to be determined. These very accurate determinations brought out some interesting details with regard to the "molecular volumes" of the substances in solution. Phosphoric and sulphuric acids showed a decided diminution of this volume at extreme dilutions, while sugar, hydrochloric and acetic acid, and sodium chloride and carbonate did not show this diminution.

THE *Annales de Chimie et de Physique* for September contains a paper, by M. Henri Bagard, on the thermoelectric force between two electrolytes, and on the Thomson effect in the case of electrolytes. The paper contains a very complete history of the work which has been done on this subject. The author uses a number of thermoelectric junctions joined in series, and measures the electromotive force developed by a given difference in temperature between the hot and cold surfaces of separation between the electrolytes by means of a capillary electrometer. This electrometer was capable of indicating an electromotive force of one-hundred-thousandth of a volt. In order to check the diffusion which takes place at the common surface of the electrolytes, the author uses a porous membrane. By using membranes composed of such different substances as goldbeater's skin and vegetable parchment, it was proved that the membrane had no effect on the electromotive force, except to cause it to diminish slightly with time. Thus the results obtained with a membrane are probably identical with what would be obtained could observations be made without a membrane, and without diffusion and convection currents being set up through the surface of separation. Observations were taken both while the temperature of one junction was rising and again when cooling. The points obtained during the second of these operations often fell below the curve given by the previous set. This effect, which never amounted to a difference of $\frac{1}{10000}$ volt, the author considers to have been entirely due to diffusion. Thermoelectric couples, consisting of solutions of two different salts, and of solutions of the same salt but of different concentration, were examined, and the results obtained are shown by means of curves. In order to examine the Peltier and Thomson effects in the case of electrolytes, small bolometers were employed to measure the change in temperature. The important fact that the Peltier effect is of opposite sign on opposite sides of the neutral point was amply verified, and it appears that the change of sign takes place at the neutral point. In all cases the thermoelectric phenomena, the Peltier effect and the Thomson effect gave results in the case of electrolytes similar to those obtained with metals.

"CREAMERIES and Infectious Diseases" is the title of a short paper which Dr. Welply has had reprinted from the *Lancet*. It is a most useful little pamphlet, inasmuch as it calls attention to a danger which, so far, has escaped public notice. Creameries receive, as is well known, their milk from a number of farms; but after the cream has been removed, some of the skim or separated milk is sent back to the farms, where it is consumed in various ways. The milk received from the various farms is all mixed together, and thus it is not difficult to see how one case of typhoid fever, or some other illness on one of these farms, may not only infect the creamery, but may, by means of the separated milk, infect the whole group of dairies supplying this creamery, thus starting an indefinite number of fresh disease centres. Dr. Welply describes an outbreak of typhoid fever which he traced to a creamery, and to the use of food or milk from dairies which became infected secondarily. In several of the dairies which he visited, he states that he found the dairy-maids acting in the dual capacity of milkers and nurses, and he is distinctly of opinion that the contagium got into the milk from the hands of the dairy-maids. It is clear that unless we can obtain stringent regulations passed, such as are in use in Denmark, Sweden, and Germany, and which our Board of Agriculture have published in their reports on dairy farming in these countries, unless we can procure similar legislative measures, co-operative dairy farming in England will always remain a continual source of danger to the public health. Dr. Welply says "it would be wise at all times to boil separated milk when used as an article of human diet"; we would go still farther, and say that it is undesirable to drink any milk which has not been previously thoroughly boiled, not warmed or brought to the boil, but boiled for several minutes. The National Health Society took this question up some years ago, and issued a short leaflet on the advisability of boiling all milk before use.

LUERSSEN AND HAENLEIN'S *Bibliotheca Botanica* will in future be edited by Prof. C. Luerssen and Prof. B. Frank.

MESSRS. BLACKIE AND SON have just issued part 6 of Prof. Oliver's translation of Prof. Kerner's "Natural History of Plants."

WE have received the Calendars for the Session 1894–5, of the University College, Bristol, the Durham College of Science, Newcastle-upon-Tyne, and the Merchant Venturers Technical College, Bristol.

THE General Report on the Operations of the Survey of India Department for 1892–93 has just been issued from the office of the Superintendent of Government Printing, Calcutta.

THE June number of *Timehri*, the journal of the Royal Agricultural and Commercial Society of British Guiana, has just come to hand, and contains, as usual, a number of very varied and interesting papers, notably, "The Guiana Orchids," by the editor—James Rodway; "Late Rainfalls, some of their Effects," by James Gillespie; and "Some Enemies of our Canefields," by S. R. Cochran. The society celebrated the fiftieth year of its existence in March of this year, when a successful historical exhibition was held in honour of the event.

THE sixteenth annual meeting of the Greenock Natural History Society was held on September 28, Mr. T. L. Patterson, president, occupying the chair. During the session 1893–94 seven papers were read, viz.: "The Sorghum Sugar Experiments in the United States," by Mr. T. L. Patterson; "A Study of Fungi," by Dr. M. Calder; "Scenes from Australia," by Mr. Thomas Steel; "Gems and Precious Stones," by Mr. James M'Neil; "The Evolution of Navigation and Nautical Astronomy," by Mr. G. W. Niven; "Plants with Angular Stems," by Mr. John Ballantyne, Rothesay; "Notes on the Cladocera," by Mr. M. F. Dunlop.

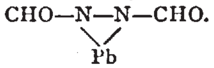
"SCIENCE is measurement." Mr. J. Lawrence, of 56 Fulham Road, London, evidently believes that the converse of this is true, for he has sent us a "Tell-tale" milk-jug, which London milkmen will probably regard with sorrowful feelings. The object of the jug is to furnish householders with a standard wherewith to judge the probity of their dairymen. The jug is a glass measure graduated at every quarter-pint. Below each pint and half-pint mark three lines are etched showing the thickness of cream which should appear in milk of average quality, in milk of good quality, and in milk of very good quality after the liquid has been allowed to stand for a time. Both the quantity and the quality of the milk can thus be easily tested.

THE Society for Promoting Christian Knowledge have just brought out a second edition of "Our Secret Friends and Foes," by Prof. Percy Frankland, F.R.S. It will be remembered that the volume was the source of a good deal of discussion between some members of the Society, who, with the late Lord Coleridge at their back, announced their intention of retiring from their membership unless the book was withdrawn from circulation, it being, according to their interpretation, written in support of vivisection. That the Society did not yield to the very considerable pressure brought to bear upon them, is evidenced by the appearance of the second edition, which, whilst containing an entirely new chapter on the action of light on micro-organisms, remains otherwise, with the exception of a few (mostly verbal) alterations, unchanged.

MESSRS. CHAPMAN AND HALL will publish, almost immediately, a complete "Text-book of Mechanical Engineering," by Mr. W. J. Lineham, the Head of the Engineering Section of the Goldsmiths' Institute, New Cross. The work consists of nearly eight hundred pages and more than seven hundred figures. The first half is devoted to practical work, viz. casting and moulding, pattern-making, and casting design; metallurgy and properties of materials; smithing and forging; machine tools; marking off; fitting, machining, and erecting; boiler-making and plate-work. The second part of the book deals with theory and examples, the order of treatment being strength of materials; energy and the transmission of power to machines and heat engines; hydraulics and hydraulic machines. The book is not supposed to be an exhaustive treatise on mechanical engineering; nevertheless, it will be a valuable aid to engineering students and apprentices, and engineering draughtsmen generally.

SINCE the publication of "Forthcoming Scientific Books' in our issue of September 20, the following list of announcements has been sent to us by the Cambridge University Press:—"The Scientific Papers of John Couch Adams"; "A Treatise on Spherical Astronomy," by Prof. Sir Robert S. Ball, F.R.S.; "Hydrodynamics: a Treatise on the Mathematical Theory of the Motion of Fluids," by Prof. H. Lamb, F.R.S., new edition; "Catalogue of Scientific Papers compiled by the Royal Society of London," new series for the years 1874-83, vol. xi. in the press; "A Treatise on Geometrical Optics," by R. A. Herman; "An Introduction to Abel's Theorem and the allied Theory," by H. F. Baker; "A Treatise on Geometrical Conics," by F. S. Macaulay; "An Elementary Introduction to Mineralogy," by R. H. Solly; "Euclid's Elements of Geometry," Books XI. and XII., by H. M. Taylor; "Arithmetic for Schools," by C. Smith, with or without answers, second edition; "Key to C. Smith's Arithmetic"; "Practical Physiology of Plants," by F. Darwin, F.R.S., and E. H. Acton; "Practical Morbid Anatomy," by Dr. H. D. Rolleston and Dr. A. A. Kanthack; "The Distribution of Animals," by F. E. Beddard, F.R.S.; "Petrology," by A. Harker; "Text-book of Physical Anthropology," by Prof. Alexander Macalister, F.R.S.; "The Vertebrate Skeleton," by S. H. Reynolds; "Fossil Plants: a Manual for Students of Botany and Geology," by A. C. Seward; "Elements of Botany," by F. Darwin, F.R.S.; "Mechanics and Hydrostatics," by R. T. Glazebrook, F.R.S.; "Electricity and Magnetism," by the same author.

MESSRS. CHARLES GRIFFIN AND CO. have also sent a list of the scientific books they hope to issue during the ensuing season; it is as follows:—"Petroleum," a treatise on the geographical distribution, geological occurrence, chemistry, production, and refining of petroleum; its testing, transport, and storage, and the legislative enactments relating thereto, together with a description of the Shale Oil industry, by Boverton Redwood, assisted by Geo. T. Holloway, with maps and illustrations; "Calcareous Cements: their Nature, Preparation, and Uses," with some observations on cement testing, by Gilbert R. Redgrave; "Griffin's Chemist's Pocket-book": tables and data for analysts, chemical manufacturers, and scientific chemists, by J. Castell-Evans; "Measurement Conversions" (English and French), 28 graphic tables or diagrams, showing at a glance the mutual conversion of measurements in different units of length, areas, volumes, weights, stresses, densities, quantities of work, horse powers, temperatures, &c., for the use of engineers, surveyors, architects, and contractors, by Prof. Robert Henry Smith; "The Metallurgy of Iron," by Thomas Turner; "An Elementary Text-book of Metallurgy," for the use of younger students and those commencing the study of metallurgy, by Prof. A. Humboldt Sexton, with numerous illustrations; "Kitchen Boiler Explosions: why they occur, and how to prevent their occurrence," a practical hand-book, based on actual experiments, by R. D. Munro; "Fibroid Diseases of the Lung, including Fibroid Phthisis," by the late Sir Andrew Clark, Bart., F.R.S., and Drs. W. J. Hadley and Arnold Chaplin, with tables, and eight plates in colours; "Practical Hygiene," including air and ventilation, water, supply and purity; food and the detection of adulterations, sewage removal, disposal, and treatment, epidemics, &c., by Surgeon-Major A. M. Davies, with illustrations; "A Manual of Ambulance," by J. Scott Riddell, with numerous illustrations and full-page plates; "The Hand-Rearing of Infants: a Guide to the Care of Children in Early Life," by Dr. John Benj. Hellier; "Year-book of the Scientific and Learned Societies of Great Britain and Ireland," compiled from official sources, including lists of the papers read during 1894 before Societies engaged in fourteen departments of research. Twelfth annual issue (early in 1895).

ONE of the most striking features of chemical progress at the present time is the rapid advance which is being effected in our knowledge of the compounds of nitrogen. Another compound of primary importance, symmetrical hydrazo-ethane, $C_2H_5NH . NHC_2H_5$, the symmetrical di-ethyl derivative of hydrazine, has been isolated in the laboratory of the Berlin University by Dr. Harries. Prof. Emil Fischer has already obtained the unsymmetrical di-ethyl hydrazine, and Prof. Curtius, to whom we owe the discovery of hydrazine itself, some time ago succeeded in obtaining the symmetrical di-benzyl hydrazine, but hitherto the simple symmetrical fatty hydrazines have eluded isolation. Indeed it is only by a somewhat circuitous, although practically quite easy, series of reactions that symmetrical di-ethyl hydrazine has at length been prepared. A remarkable derivative of hydrazine was first obtained, in which one hydrogen of each amidogen radicle was replaced by the radicle formyl, CHO, and the other by the metal lead, the compound being represented by the formula  $\overset{\text{CHO—N—N—CHO}}{\diagdown\diagup}\atop{Pb}$ This substance, a white powder, is readily obtained by reacting with sodium upon di-formyl hydrazine, a compound with which Prof. Curtius has made us familiar, and subsequently decomposing the latter with sugar of lead. The lead compound, when slightly heated in a sealed tube with ethyl iodide, together with sand to maintain porosity, and magnesia to fix the liberated hydriodic acid, is converted into a compound in which the lead atom is replaced by two ethyl groups. This latter compound, a somewhat volatile liquid, is treated with fuming hydrochloric acid, which removes the formyl groups and converts the compound into symmetrical di-ethyl hydrazine hydrochloride, which is precipitated. Upon distillation with caustic potash the free di-ethyl hydrazine passes over at 85°. The new compound is a liquid of pleasant odour, reminding one at the same time of ether and of weak ammonia. It reduces Fehling's solution with great energy upon gently warming, and silver nitrate in the cold. It vigorously attacks caoutchouc. Its hydrochloride contains two molecules of hydrogen chloride, and crystallises well in plates melting at 160°. The symmetrical di-ethyl hydrazine behaves in a most interesting manner with certain oxidising agents, particularly mercuric oxide. The yellow oxide reacts in a most violent manner, but the red oxide affords a more manageable reaction; the products are a large quantity of mercury di-ethyl, $Hg(C_2H_5)_2$, and a smaller quantity of azoethane, $C_2H_5N=NC_2H_5$, the ethyl analogue of the well-known azobenzene. The symmetrical and unsymmetrical di-ethyl hydrazines are clearly distinguished by their reactions with nitrous acid, for while the latter yields di-ethylamine and nitrous oxide, the former affords ethyl nitrite together with a smaller quantity of a nitroso compound.

THE additions to the Zoological Society's Gardens during the past week include two Bonnet Monkeys (*Macacus sinicus*, ♂ ♂) from India, presented respectively by Mr. Philip E. Morel and Miss Ling; a Common Marmoset (*Hapale iacchus*) from Brazil, presented by Mr. A. E. W. Burns; a Brush-tailed Kangaroo (*Petrogale penicillata*, ♀) from New South Wales, presented by Lady Isabel Clayton; three Australian Cranes (*Grus australasiana*) from Australia, a Brown Crane (*Grus canadensis*) from North America, an Indian White Crane (*Grus leucogeranus*) from India, presented by Mr. E. W. Marshall; two Californian Quails (*Callipepla californica*) from California, presented by Mr. H. H. Howard Vyse; a Ground Hornbill (*Bucorvus abyssinicus*), from Nyassaland, presented by Mr. H. H. Johnston, C.B.; three Pratincoles (*Glareola pratincola*), four Night Herons (*Nycticorax griseus*), a Great Bustard (*Otis tarda*), South European, presented by Lord Lilford; three Dwarf Chameleons (*Chamaeleon pumilus*) from South Africa, presented by Mr. C. Stonham; two Cerastes Vipers (*Vipera cerastes*), two Egyptian Eryx (*Eryx jaculus*), a Cliffords Snake (*Zamenis cliffordi*) from Egypt, deposited; A Simonys Lizard (*Lacerta simonyi*) from the Island of Hiero, Canaries, presented by Mr. Sydney Crompton; a Deadly Snake (*Trigonocephalus atrox*) from Trinidad, presented by Messrs. Mole and Urich; an Axis Deer (*Cervus axis*), a Rufous Rat Kangaroo, *Hypsiprymnus rufescens*) born in the Gardens.

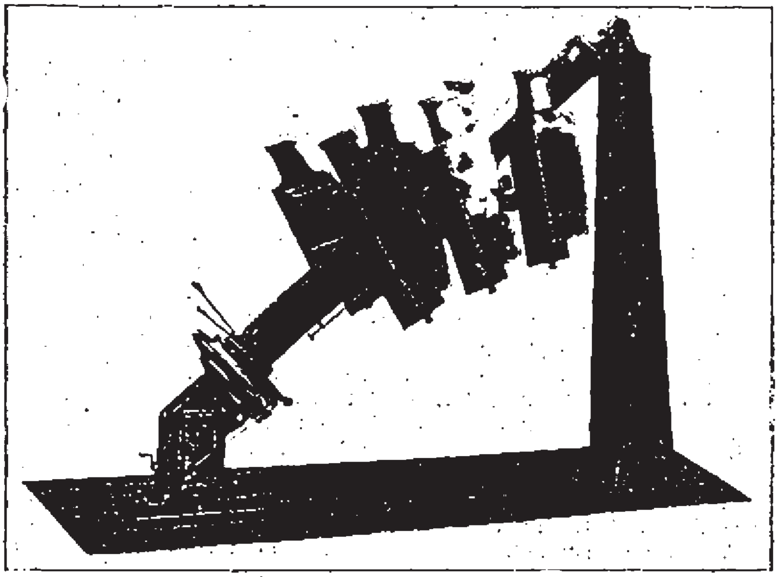
OUR ASTRONOMICAL COLUMN.

AN INSTRUMENT FOR PHOTOGRAPHING METEORS.—Up to the present time meteoric astronomy has had little, if any, instrumental equipment to further its development, the nature of the phenomena rendering simple naked eye observations the only available means of research. It is true that even now we know of a very considerable number of radiant points, and what is more, we have been able to note the daily movements of some of these in the heavens; but this knowledge has only been gained by the great patience and perseverance of astronomers, the most notable being Mr. W. F. Denning. With a thorough knowledge of the constellations, a good globe or star-map, and an accurate eye, he has been able to plot down track after track of these travellers through space, deducing from their paths the points in the heavens from which they are coming.

What will most probably lead to a great advance in the determination of the positions of these radiant points, is the introduction of photography for recording permanently the visible tracks in the sky. There may have been many attempts already for photographing these trails, and the writer himself a few years back, with an ordinary camera, was fortunate enough to catch nine trails on the sensitive plate. The camera being fixed and not equatorially mounted, the star images were consequently curved arcs, and not points. Even on this plate fairly accurate positions of the trails could have been obtained.

A somewhat unique instrument for locating the tracts of meteors and their radiant points, has recently been constructed by Messrs. Warner and Swazey for the Yale University Observatory. The accompanying illustration of the instrument is from *Popular Astronomy* for September.

The illustration shows the polar axis of the "English" form carrying a number of cameras. The axis is of a tubular form, about twelve feet long, the ends working on pivots which are capable of adjustment. The southern support is connected with clockwork, while that at the northern end is supported on a pillar in which are the driving weights in connection with the clock by cords passing under the floor. On the declination axis are fitted two arms which serve as supports to the cameras, three cameras being on the eastern and three on the western side. These cameras are so oriented that they take, in their respective fields, adjoining portions of the sky, so that altogether they cover a very large area. The instrument is supplied with slow motions, both in right ascension and declination, and the clockwork has an electric control. Whether satisfactory results have yet been obtained, one cannot say, but the apparatus was intended to be used for the Perseid swarm of October last.



SUN-SPOT OBSERVATIONS AT THE POTSDAM OBSERVATORY

IN the publications of the "Potsdam Astrophysical Observations," Dr. Sporer has previously (No. 17) presented us with the observations of the sun-spots for the years 1880 to 1884. The most recent addition to these records will be found in No. 32, in which are collected the sun-spot observations for the years 1885 to 1893. The observations themselves are given in all details, being grouped together with regard to the period of rotation. These are followed by a brief discussion, from which these notes and extracts have been made.

The following table, bringing together the results relative to